

Remarks

35 U.S.C. §112

Applicant adopts language suggested by the examiner in paragraph 4(a) of the office action.

The concentration ranges referred to in claims 2 and 3 refer to the aqueous polyvinyl alcohol solution without additive and without biologically active material or else. The amendment particularly points out this clarification.

The amendments to claims 7 and 8 particularly point out the clarification that the ranges recited apply to the pure solution of the additive without any other substances.

The amendment to claim “d” is supported in the original specification’s disclosure at at least page 7 lines 4 – 12 and page 8, lines 1 – 13.

The claim amendments overcome the objection based on lack of antecedent basis.

Claim 20 has been cancelled, obviating examiner’s paragraph 4f.

In response to examiner’s paragraph 4g, applicant adopts examiner’s suggested amendment.

35 U.S.C. §103(a)

Claims 1 – 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Charmot et al. (U.S. No. 4,737,533).

Claims 1 – 24 also stand rejected under 35 U.S.C. §103(a) as being unpatentable over Venkatraman et al. (U.S. No. 6,039,977).

In response to these rejections, applicant first reviews the process as recited in the claims, which is supported in the original application at page 3, lines 8 – 15, page 4, lines 4 – 13, page 5, lines 16 - 23, and throughout the examples.

As disclosed and claimed, the biocatalyst is formed on the basis of a polyvinyl alcohol solution wherein the polyvinyl alcohol has a degree of hydrolysis of at least 98 mol %. The polyvinyl alcohol forms a gel under this first step condition.

An additive is dissolved in the aqueous polyvinyl alcohol solution. The additive has the properties recited in step b of claim 1. The biologically active material is added.

Then the solution is dehydrated so that the maximum residual water content is 50 wt. % as recited in step d of claim 1. The phase separation occurs by this dehydration of the overall solution.

The phase of separation will not occur by just adding the additive to the polyvinyl alcohol solution, if both solutions (the polyvinyl alcohol solution and the additives solution) are made according to normal techniques. The phase separation that initiates the gelling of the polyvinyl alcohol only occurs if the dehydration takes place and the overall solution becomes highly viscous. Once the polyvinyl alcohol has gelled, it may be rehydrated by adding water in order to establish good conditions for the biologically active material, without the risk of solving the polyvinyl alcohol again.

Charmot et al.

Charmot et al disclose a method of forming a porous aqueous gel where the gel system (the macromolecular substance) is agarose or gelose or other substances like gelatin and collagen which are able to gel by cooling down from a temperature in the range of about 30 to about 80 ° C (Col 2, line 17 to 19).

There are some additives, namely a water-soluble linear polymer B which may be polyethylene glycols, polyvinyl alcohol, polyvinylpyrrolidone, etc. Further additives are plasticizers, which again may be polyethylene glycols, however with a molecular mass less than 400.

The shaping process of the gel which is of interest for the present application is described at column 6, beginning at line 56. According the Charmot disclosure, the mixture is poured onto a support placed on a horizontal glass plate. The mixture is then cooled to form an aqueous gel which adheres to the plate. Therefore, the gel formation in Charmot is only caused by the cooling down of the mixture.

In Charmot, the whole is dried only after the gel has been formed, (see, Column 6, beginning at line 67). Clearly, Charmot teaches away from the presently

claimed process by teaching only a cooling step for gel forming in its agarose system. Even under the assumption that the plasticizer was polyethylene glycol and the polymer B was polyvinyl alcohol, there is no chance to induce a phase separation. Such a phase separation could occur only if both solutions were heavily dried before the gel has formed. This is not the case in the process described by Charmot et al. Also, Charmot et al. do not describe the aim of the addition of the linear polymer B, nor do they describe whether the addition is stabilized a biologically active substance such as an enzyme or not.

In summary, Charmot et al. does not teach, suggest or motivate gelling of polyvinyl alcohol. This is true even if poly ethylene glycol is added in addition to polyvinyl alcohol. This is because Charmot et al. do not teach, suggest or motivate the dehydration step d recited in claim 1 of the pending claims.

Finally, the only example recited in Charmot et al. disclosing the use of a polyvinyl alcohol, is example 3 reciting rhodoviol 4-125 of Rhone-Poulenc. As is easily apparent on the Rhone-Poulenc website, the disclosed polyvinyl alcohol has a degree of hydrolysis of 88.5%. As disclosed in the present application, this kind of polyvinyl alcohol cannot gel. This fact is affirmatively recited in the pending claim by requiring a minimum degree of hydrolysis for gelling polyvinyl alcohol of 98%.

Venkatraman et al. (US 6,039,977)

Venkatraman et al. disclose a conventional process taking several hours. It is precisely this disadvantageous delay that the novel process of the present application was developed to overcome, as was recited in the original disclosure at page 3, lines 25 – 29 and page 4, at lines 25- 30. The time consuming Venkatraman process discloses a pharmaceutical polyvinyl alcohol hydrogel formulation made by freezing the solution and thawing the frozen solution for a period of hours.

The examples in column 11 and 12 of the Venkatraman reference clearly show that the polyvinyl alcohol gel is produced with a pure polyvinyl alcohol solution and the well known prior art freezing/thawing process. In order to include a therapeutically effective amount of a drug in the polyvinyl alcohol gel, the drug may be added to the polyvinyl alcohol solution with a “carrier”, for example silicone, waxes, petroleum jelly, polyethylene glycol, propylene glycol, liposomes etc.

Even if the drug is applied to the polyvinyl alcohol solution by polyethylene glycol as a carrier, there will be no gel formation when using the method taught at columns 11 and 12 of Venkatraman.

Venkatraman does not disclose, teach or motivate any drying process. In fact, Venkatraman teaches away from the presently disclosed process by teaching a repetitive freeze/thawing cycle technique.

Since there is no drying process as recited in the pending claims, there cannot in Venkatraman occur a phase separation if such a phase separation requires dehydration by at least 50%. Such dehydration is nowhere suggested in Venkatraman.

Neither Charmot nor Venkatraman disclose, suggest or motivate the claimed process. They merely represent prior art techniques (gelling of agarose by reducing the temperature and the gelling of polyvinyl alcohol by freeze-thaw cycles). The pending claims recite the novel process of the present application, including the gelling of polyvinyl alcohol by using a suited additive, dehydrating the whole solution and inducing a phase separation after achieving the recited concentration ranges.

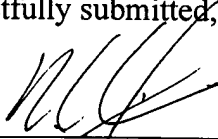
Withdrawal of Claims 25 -30

Applicant traverses examiner's restriction.

CONCLUSION

The grounds for rejection having been overcome or rendered moot, applicant requests promote and favorable consideration of the pending claims.

Respectfully submitted,



Robert C. Haldiman, Reg. No. 45,437
Husch & Eppenger, LLC
401 Main Street, Suite 1400
Peoria, Illinois 61602-1241
(309) 637-4900